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A MIOCENE BOOBY AND OTHER RECORDS FROM THE CALVERT FORMATION OF MARYLAND

By Alexander Wetmore

Systematic search in the Miocene deposits of Chesapeake Bay has brought to attention the remains of many cetaceans, but discoveries of birds have been relatively few. The fossils in these beds are found in moist clay, a condition destructive to delicate bones such as those of birds, which may account for the relative scarcity of this group in the formation in question.

Several years ago I reviewed what bird material was available from these deposits,[1] noting only two species that were definitely identified—*Puffinus conradi* Marsh and *Moris loxostyla* (Cope), the bird named *Sula atlantica* by Shufeldt being a synonym of the latter.

Though the Calvert cliffs are kept regularly under observation, no further pertinent bird material came to hand until 1934, when Dr. W. Gardner Lynn and R. Lee Collins, of Johns Hopkins University, began an intensive survey of the stratigraphy of the Miocene along Chesapeake Bay and its tributaries. This work has been continued by Mr. Collins subsequent to his departure from Johns Hopkins. Specimens obtained by these gentlemen have been placed in the United States National Museum, and the notes herein discuss the avian material found to 1937 in their collecting.

Figures illustrating certain specimens have been made for me by Sydney Prentice.

[1] Auk, 1926, pp. 462–468.

Family PROCELLARIIDAE

PUFFINUS species

A specimen (U.S.N.M. no. 15160) comprising about two-thirds of the distal portion of a right humerus was obtained by R. Lee Collins on March 30, 1937, on the beach about 1 mile south of the Chesapeake Beach pier. It is well fossilized, dull brown in color, and evidently a bone that has weathered out from the Calvert formation in the adjacent cliffs.

It is from a species of the dimensions of living Cory's shearwater (*Puffinus diomedea borealis*), being distinctly larger than *P. conradi* from the Miocene of Maryland, and it evidently represents an undescribed form. Unfortunately it has been worn in the sands of the beach until the projecting processes of the distal end have lost those characters that serve to characterize species in this group. While obviously different from Cory's shearwater because of its antiquity, no characters remain in the bone that will serve to separate it in a technical diagnosis. It is listed therefore for the present under the generic name only.

It has the following measurements: Greatest transverse diameter across the distal end, 14.9 mm; transverse diameter of shaft near center, 6.7 mm.

Family SULIDAE

SULA AVITA, new species

Characters.—Lower end of humerus (fig. 2) similar to that of modern *Sula piscator* (Linnaeus) [2] but much smaller; ectepicondylar process less prominent; brachial depression shallower; olecranal fossa relatively smaller and less deeply impressed.

Type.—U.S.N.M. no. 13854, distal end of right humerus (processes somewhat broken), collected in situ in zone 10, Calvert formation of the upper Miocene, near Plumpoint, Md., on January 1, 1934, by Dr. W. G. Lynn.

Description.—Shaft compressed at distal end, flattened on anterior face, with the inner margin thin edged, rounding from this to join the outer margin at a right angle; ectepicondylar process slight, extending out in a gradual curve; radial trochlea (partly broken away) comparatively small; ulnar trochlea rounded, elongate, globular, projecting distally distinctly below the level of the radial trochlea; tubercle for *pronator brevis* elongate, triangular, rising in a low point; brachial depression flat and slightly impressed; olecranal fossa relatively shallow. Bone dull brown in color, not mineralized, but with all organic matter removed so that it appears slightly porous.

[2] *Pelecanus piscator* Linnaeus, Systema naturae, ed. 10, vol. 1, 1758, p. 134.

Measurements.—Transverse diameter of shaft, 9.5 mm; breadth of distal end, 15.2 mm.

Remarks.—A fossil gannet, *Moris loxostyla* (Cope), is known from the Miocene deposits of Calvert County, Md., but it is so much larger, having the distal end of the humerus 21.1 mm,[3] that it may be dismissed without detailed comment. Further, the species here described seems related to the true boobies of the genus *Sula*, the humerus of which differs from that of *Moris* in the more shortened insertion for the pronator muscles and the broader radial condyle.

In size *Sula avita* approaches *S. pygmaea* Milne Edwards[4] from the lower Miocene deposits of Léognan (faluns de Saucats), France. From the original description and figures it appears that *S. pygmaea* is slightly smaller. *Sula avita* in addition differs in the conformation of the ectepicondylar area, which is larger, and also in the form of the olecranal depression. *S. pygmaea* possibly is not properly placed in the genus *Sula.*

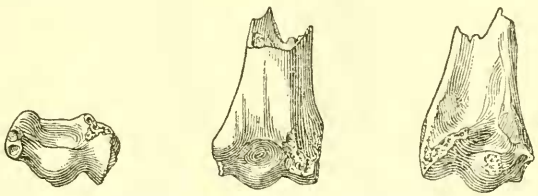

FIGURE 2.—Type of *Sula* (*Microsula*) *avita*, new species: Lower end of humerus. About natural size.

The type of *Sula avita* was the first specimen to come to hand, but it has been followed by other fragments that are identified as from this same species. Most important of these is a nearly complete left metacarpal bone (U.S.N.M. no. 15158) collected by R. Lee Collins on July 3, 1936, from zone 10 in the Calvert formation, 2 feet below the top of the thick shell bed, at a point 1.1 miles south of Plumpoint, Md. While apparently from a larger individual than the fragmentary humerus taken as the type of *avita*, the proportionate difference between the two is about that existing between male and female of *S. piscator.*

The specimen (fig. 3) differs from *Sula piscator* in having the projecting process of metacarpal I rising more abruptly, with the entire process larger, and in the much smaller pneumatic foramina on the proximal end, these being almost closed. Its form and characters are shown in the accompanying drawings.

There is also the shaft of a right humerus (U.S.N.M. no. 15157) that is referred to this species. This specimen was found by R. Lee

[3] See Wetmore, Auk, 1926, p. 468.

[4] Bibl. École Hautes Études, vol. 11, art. 3, 1874, p. 8, pl. 12, fig. 2–23.

Collins in zone 10 of the Calvert formation, at the beach level 1 mile south of Plumpoint on April 7, 1934. The specimen consists of a little more than the proximal half of the bone, with the head missing but with the lower part of the deltoid crest present. The shape is similar to that of *Sula piscator* except for decidedly smaller size. The line of attachment for the *latissimus dorsi anterioris* muscle is strong and heavy, running for most of its course above the central axis of the bone when viewed from the side.

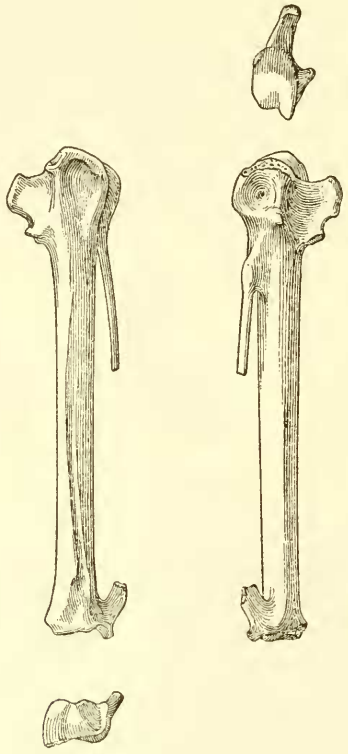

FIGURE 3.—*Sula* (*Microsula*) *avita*, new species: Left metacarpal, including profile views of the proximal and distal ends. About natural size.

In summary, the impression given by this fragmentary material is that of a booby decidedly smaller than any of the living species. In size it resembles most closely the fossil *Sula pygmaea* of the Miocene of Europe but differs from that species in the form of the distal end of the humerus.

The nearly obsolete pneumatic foramina, so prominent in modern gannets and boobies, is remarkable, indicating that this pneumaticity has been a more recent development than other characters that mark this family. Data on this point from other Miocene sulids will be of

interest when they become available. To signalize this character in *Sula avita* I propose to erect for it **Microsula** as a new subgenus, with *Sula* (*Microsula*) *avita* as its type.

MORIS species

On July 10, 1937, Mr. Collins secured the proximal end of a right ulna of a bird of this group at a point 1 mile south of Plumpoint wharf. The bone (U.S.N.M. no. 15475) was obtained from zone 10, about 2 feet above the heavy shell layer. Though there is some individual variation in the modern species of gannets, the genus *Moris* differs from the boobies, genus *Sula*, in having the internal cotyla of the ulna more elongated in form. This does not always hold but is true in a number of specimens that I have seen. The Plumpoint specimen is referred to *Moris* on this basis.

The fragment seems to come from a bird slightly larger than living *Sula leucogaster*. It appears to be from a smaller individual than the bones that are known from *Moris loxostyla* (Cope) but may be that species, which comes from the Miocene of Maryland and New Jersey. It is identified, however, only to genus.

Family COLUMBIDAE

A distal portion of a left radius (U.S.N.M. no. 15159) collected by R. Lee Collins, September 8, 1936, 1.6 miles south of Plumpoint, Md., in zone 10 of the Calvert formation, represents a species of the pigeon family. It comes from a bird slightly larger than the living mourning dove (*Zenaidura macroura*).

Though it is an interesting record of a member of this group, it cannot be identified except to family because of its fragmentary nature and the lack of specific characters in the radius of birds in general. It is the oldest record in North America for this group of birds.

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